

## **On-line image analysis of explosive activity captured by surveillance cameras allows major eruptive events forecasting**

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The use of stationary remote cameras for visual monitoring of the eruptive activity was implemented in the monitoring system of Etna and Stromboli volcanoes since 1993 and 1994 respectively. Camera records of eruptive activity became the major information source for describing eruptive phenomena occurred at Etna and Stromboli in the last years. However, the main goal of the continuous visual monitoring of active basaltic volcanoes is to analyze eruptive activity images in search of precursors of the paroxysmal events that suddenly interrupt the persistent mild strombolian activity. Stromboli represent the perfect test site for this investigation because its typical activity consists of intermittent mild explosions lasting a few seconds, which take place at different vents and at variable intervals. However, the routine activity can be interrupted by more violent, paroxysmal explosions, that eject m-sized scoriaceous bombs and lava blocks to a distance of several hundreds of meters from the craters, endangering the numerous tourists that watch the spectacular activity from the volcano's summit located about two hundreds meters from the active vents. Using image analysis we identified any change of the explosive activity trend that preceded a particular eruptive event, like paroxysmal explosions, fire fountains and lava flows. The analysis include the counting of the explosions occurred at the different craters and the parameterization in classes of intensity for each explosion on the base of tephra dispersion and kinetics energy. From September 2001 an on-line image analyzer called VAMOS (Volcanic Activity Monitoring System) operates detection and classification of explosive events in quasi real-time. The system has automatically recorded and analyzed the change in the energetic trend that preceded the 20 October 2001 paroxysmal explosion that killed a woman and the strong explosive activity that preceded the onset of 28 December 2002 lava flow and landslide forming eruption.

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